

1 CLAIMS:

2 1. A method of encapsulating a semiconductor device,
3 comprising:

4 providing at least one semiconductor device;

5 providing a dispensing apparatus having a plurality of dispensing
6 orifices proximate the at least one semiconductor device; and

7 dispensing a liquid encapsulating material through the plurality of
8 orifices and over the at least one semiconductor device.

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10 2. The method of claim 1 wherein the liquid encapsulating
11 material is dispensed onto the at least one semiconductor device.

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13 3. The method of claim 1 further comprising curing the
14 dispensed liquid encapsulating material.

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16 4. The method of claim 1 wherein the dispensing comprises
17 flowing the liquid encapsulating material simultaneously through the
18 plurality of orifices.

1 5. The method of claim 1 wherein the dispensing comprises
2 moving at least one of the orifices relative to the at least one
3 semiconductor device while flowing the liquid encapsulating material
4 through the at least one orifice.

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6 6. The method of claim 5 wherein the moving comprises
7 moving the at least one semiconductor device.

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9 7. The method of claim 5 wherein the moving comprises
10 moving the at least one orifice.

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12 8. The method of claim 1 wherein the at least one
13 semiconductor device is an integrated circuit chip.

1 9. A method of forming an electronic package, comprising:
2 providing a circuit board comprising a circuit pattern;
3 joining a semiconductor device to the circuit board in electrical
4 connection with the circuit pattern;
5 providing a dispensing apparatus having a plurality of dispensing
6 orifices proximate the semiconductor device;
7 dispensing liquid encapsulating material through the plurality of
8 orifices and onto the semiconductor device; and
9 curing the liquid encapsulating material.

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11 10. The method of claim 9 wherein the dispensing comprises
12 dispensing liquid through only one of the orifices and onto the
13 semiconductor device, and dispensing liquid through a remainder of the
14 plurality of orifices and onto the circuit board proximate the
15 semiconductor device.

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17 11. The method of claim 9 wherein the dispensing comprises
18 dispensing liquid through at least one of the orifices and onto the
19 semiconductor device, and dispensing liquid through a remainder of the
20 plurality of orifices and onto the circuit board proximate the
21 semiconductor device.
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1 12. The method of claim 11 wherein the liquid dispensed
2 through the remainder of orifices is the same as that dispensed through
3 the at least one orifice.
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5 13. The method of claim 11 wherein the liquid dispensed
6 through the remainder of orifices is different than that dispensed
7 through the at least one orifice.
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9 14. The method of claim 11 wherein the dispensing through the
10 remainder of orifices occurs simultaneously with the dispensing through
11 the at least one orifice.
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13 15. The method of claim 11 wherein the remainder of orifices
14 comprises at least four orifices.
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16 16. The method of claim 15 wherein the semiconductor device
17 comprises a square-shaped lateral periphery.
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19 17. The method of claim 9 wherein the semiconductor device is
20 an integrated circuit chip.
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1 18. A method of encapsulating at least two semiconductor
2 devices, comprising:

3 providing at least two semiconductor devices over a substrate;

4 providing a dispensing apparatus having at least two dispensing
5 orifices, a first of the at least two dispensing orifices being received
6 proximate a first of the at least two semiconductor devices and a second
7 of the at least two dispensing orifices being received proximate a second
8 of the at least two semiconductor devices; and

9 simultaneously dispensing a liquid encapsulating material through
10 the at least two orifices and over the at least two semiconductor
11 devices.

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13 19. The method of claim 18 wherein the liquid encapsulating
14 material is dispensed onto at least one of the at least two
15 semiconductor devices.

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17 20. The method of claim 18 wherein the liquid encapsulating
18 material is dispensed onto both of the at least two semiconductor
19 devices.

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21 21. The method of claim 18 further comprising curing the
22 dispensed liquid encapsulating material.
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1 22. The method of claim 18 wherein the dispensing comprises
2 moving the at least two orifices relative to the semiconductor devices
3 while flowing the liquid encapsulating material through the at least two
4 orifices.

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6 23. The method of claim 18 wherein the semiconductor devices
7 are integrated circuit chips.

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9 24. A method of encapsulating a plurality of semiconductor
10 devices, comprising:

11 providing a plurality of semiconductor devices over substrate;

12 providing a dispensing apparatus having an array of dispensing
13 orifice sets, individual sets of the array being in correspondence with
14 individual semiconductor devices of the plurality of semiconductor
15 devices; and

16 simultaneously dispensing liquid encapsulating material through
17 orifices of different sets.

1 25. The method of claim 24 wherein the array of dispensing
2 orifice sets is aligned with a first array of the plurality of semiconductor
3 devices during the dispensing, the method further comprising moving the
4 array dispensing orifice sets to alignment with a second array of
5 semiconductor devices after the dispensing.

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7 26. The method of claim 24 wherein the liquid encapsulating
8 material dispensed through each of the different sets is the same.

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10 27. The method of claim 24 further comprising curing the
11 dispensed liquid encapsulating material.

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13 28. The method of claim 24 wherein the dispensing comprises
14 moving at least some of the orifices relative to the semiconductor
15 devices during the dispensing.

16
17 29. The method of claim 24 wherein the semiconductor devices
18 are integrated circuit chips.

1 30. The method of claim 24 wherein the individual sets comprise
2 at least one interiorly located orifice and remaining orifices peripheral
3 to the at least one interiorly located orifice, the dispensing from an
4 individual set comprising:

5 dispensing a first liquid encapsulating material through the at least
6 one interiorly located orifice and over a corresponding semiconductor
7 device; and

8 dispensing a second liquid encapsulating material through the
9 remaining orifices and over a portion of the substrate proximate the
10 corresponding semiconductor device.

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12 31. The method of claim 30 wherein the at least one interiorly
13 located orifice is one orifice, and wherein the remaining orifices are
14 four orifices.

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16 32. The method of claim 30 wherein the first and second liquid
17 encapsulating materials are the same.

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19 33. The method of claim 30 wherein the dispensing through said
20 at least one interiorly located orifice occurs simultaneously with the
21 dispensing through said remaining orifices.

1 34. The method of claim 30 wherein the dispensing through said
2 at least one interiorly located orifice occurs after the dispensing through
3 said remaining orifices.

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5 35. A method of encapsulating a plurality of semiconductor
6 devices, comprising:

7 providing a plurality of semiconductor devices over substrate;

8 providing a dispensing apparatus having an array of spaced
9 dispensing orifices, individuals of the array being in correspondence with
10 individual semiconductor devices of the plurality of semiconductor
11 devices; and

12 simultaneously dispensing liquid encapsulating material through at
13 least two of the spaced dispensing orifices and onto at least two of the
14 individual semiconductor devices.

1 36. A method of forming an electronic package, comprising:
2 providing a circuit board comprising a circuit pattern;
3 joining a plurality of semiconductor devices to the circuit board
4 in electrical connection with the circuit pattern;
5 providing a dispensing apparatus having a plurality of dispensing
6 orifices proximate the semiconductor devices;
7 simultaneously dispensing liquid encapsulating material through at
8 least two of the plurality of orifices and over at least two of the
9 semiconductor devices; and
10 curing the liquid encapsulating material.

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12 37. The method of claim 36 wherein the dispensing comprises
13 dispensing the liquid onto the at least two semiconductor devices.

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15 38. The method of claim 36 wherein the dispensing comprises:
16 dispensing a first liquid encapsulating material through the at least
17 two orifices and over the at least two semiconductor devices; and
18 dispensing a second liquid encapsulating material through a
19 remainder of the plurality of orifices and onto portions of the circuit
20 board proximate the at least two semiconductor devices.

1 39. The method of claim 38 wherein the liquid dispensed
2 through the remainder of orifices is the same as that dispensed through
3 the at least two orifices.

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5 40. The method of claim 38 wherein the dispensing through the
6 remainder of orifices occurs simultaneously with the dispensing through
7 the at least two orifices.

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9 41. The method of claim 38 wherein the dispensing through the
10 remainder of orifices occurs before the dispensing through the at least
11 two orifices.

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13 42. The method of claim 36 wherein the semiconductor device
14 is an integrated circuit chip.
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1 43. A method of forming an electronic package, comprising:
2 providing a circuit board comprising a circuit pattern;
3 joining a plurality of semiconductor devices to the circuit board
4 in electrical connection with the circuit pattern, the semiconductor
5 devices being arranged in a plurality of arrays;
6 providing a dispensing apparatus having a plurality of dispensing
7 orifices proximate some of the semiconductor devices, the dispensing
8 orifices being arranged in a single array of orifice sets which is aligned
9 with a single of the semiconductor device arrays;
10 simultaneously dispensing liquid encapsulating material through the
11 array of orifice sets and over the single array of semiconductor devices;
12 moving the orifice sets to align with another of the semiconductor
13 device arrays; and
14 simultaneously dispensing liquid encapsulating material through the
15 array of orifice sets and over the other array of semiconductor devices.

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17 44. The method of claim 43 wherein the individual orifice sets
18 comprise five orifices.
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1 45. The method of claim 43 wherein the individual orifice sets
2 comprise at least two orifices, and wherein the dispensing from an
3 individual orifice set comprises:

4 dispensing a first liquid encapsulating material through one of the
5 at least two orifices and over an individual of the plurality of
6 semiconductor devices; and

7 dispensing a second liquid encapsulating material through a second
8 of the at least two orifices and over portions of the circuit board
9 proximate the individual semiconductor device.

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11 46. The method of claim 45 wherein the first and second liquid
12 encapsulating materials are the same.

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14 47. The method of claim 45 wherein the first and second liquid
15 encapsulating materials are different.

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17 48. The method of claim 45 wherein the first and second liquid
18 encapsulating materials are dispensed simultaneously.

1 49. The method of claim 43 wherein the orifice sets comprise
2 at least one interiorly located orifice and remaining peripherally located
3 orifices, and wherein the dispensing from an individual orifice set
4 comprises:

5 dispensing a first liquid encapsulating material through said at
6 least one interiorly located orifice and onto an individual of the
7 plurality of semiconductor devices; and

8 dispensing a second liquid encapsulating material through said
9 remaining orifices and onto portions of the circuit board proximate the
10 individual semiconductor device.

11
12 50. The method of claim 43 wherein the orifice sets comprise
13 five orifices, and wherein the dispensing from an individual orifice set
14 comprises:

15 dispensing a first liquid encapsulating material through one of the
16 five orifices and onto an individual of the plurality of semiconductor
17 devices; and

18 dispensing a second liquid encapsulating material through a
19 remaining four of the five orifices and onto portions of the circuit
20 board proximate the individual semiconductor device.

1 51. The method of claim 50 wherein the first and second liquid
2 encapsulating materials are the same.

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4 52. The method of claim 50 wherein the first and second liquid
5 encapsulating materials are dispensed simultaneously.

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7 53. A method of forming an electronic package, comprising:
8 providing a circuit board comprising a circuit pattern;
9 joining a plurality of semiconductor devices to the circuit board
10 in electrical connection with the circuit pattern, the semiconductor
11 devices being arranged in a plurality of arrays;
12 providing a dispensing apparatus having a plurality of spaced
13 dispensing orifices proximate some of the semiconductor devices, the
14 spaced dispensing orifices being arranged in a single array which is
15 aligned with a single of the semiconductor device arrays;
16 simultaneously dispensing liquid encapsulating material through the
17 array of orifices and over the single array of semiconductor devices;
18 moving the orifices to align with another of the semiconductor
19 device arrays; and
20 simultaneously dispensing liquid encapsulating material through the
21 array of orifices and over the other array of semiconductor devices.
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1 54. A semiconductor device encapsulator comprising:
2 at least one vessel configured for containing liquid encapsulant
3 material;
4 a liquid dispensing apparatus in fluid communication with the
5 vessel, the apparatus having a plurality of dispensing orifices, at least
6 one of the dispensing orifices being configured for receipt over and
7 within lateral confines of a semiconductor device being encapsulated.
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9 55. The encapsulator of claim 54 comprising only one vessel.
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11 56. The encapsulator of claim 54 further comprising at least one
12 other of the dispensing orifices configured for receipt outside of the
13 lateral confines of a semiconductor device being encapsulated.
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1 57. A semiconductor device encapsulator configured to
2 encapsulate a plurality of semiconductor devices which are joined to a
3 circuit board, the encapsulator comprising:

4 at least one vessel configured for containing liquid encapsulant
5 material;

6 a dispensing apparatus having an array of dispensing orifice sets
7 in fluid communication with the vessel, individual sets of the array being
8 in correspondence with individual semiconductor devices of the plurality
9 of semiconductor devices; and

10 the device being configured to simultaneously dispense liquid
11 encapsulating material from the vessel and through orifices of different
12 sets to simultaneously cover different semiconductor devices with the
13 encapsulating material.

14
15 58. The encapsulator of claim 57 wherein each set comprises at
16 least one dispensing orifice configured for receipt over and within lateral
17 confines of a semiconductor device in correspondence with the set, and
18 at least one other of the dispensing orifices configured for receipt
19 outside of the lateral confines of the semiconductor device in
20 correspondence with the set.

1 59. The encapsulator of claim 57 wherein each set comprises
2 only one dispensing orifice configured for receipt over and within lateral
3 confines of a semiconductor device in correspondence with the set, and
4 four other of the dispensing orifices configured for receipt outside of
5 the lateral confines of the semiconductor device in correspondence with
6 the set.
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1 60. A semiconductor device encapsulator configured to
2 encapsulate a plurality of semiconductor devices which are joined to a
3 circuit board and arranged in a plurality of arrays, the encapsulator
4 comprising:

5 a dispensing apparatus having a plurality of dispensing orifices, the
6 dispensing orifices being arranged in a single array of orifice sets which
7 is aligned with a single of the semiconductor device arrays;

8 the apparatus being configured to:

9 simultaneously dispense liquid encapsulating material through
10 the array of orifice sets and over more than one of the
11 semiconductor devices of the single array of semiconductor
12 devices;

13 move the orifice sets to align with another of the
14 semiconductor device arrays; and

15 simultaneously dispense liquid encapsulating material through
16 the array of orifice sets and over more than one of the
17 semiconductor devices of the other array of semiconductor devices.
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